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Claims

[c1] 1. A method for treating the sustained casing annulus pressure in a casing annulus of a subterranean well, wherein the casing annulus contains a casing annulus fluid, the method comprising: injecting into the casing annulus a viscosified brine, wherein the viscosified brine has a density greater than the density the casing annulus fluid and wherein the viscosified brine includes a viscosifying additive selected from the group consisting of: xanthan gums; scleroglucan; hydroxyethyl cellulose (HEC); starch; poly(ethylene glycol)(PEG); poly(diallyl amine); poly(acrylamide); poly(aminomethylpropylsulfonate[AMPS]); poly(acrylonitrile); poly(vinyl acetate); poly(vinyl alcohol); poly(vinylamine); poly(vinyl sulfonate); poly(styryl sulfonate); poly(acrylate); poly(methyl acrylate); poly(methacrylate); poly(methyl methacrylate); poly(vinylpyrrolidone); poly(vinyl lactam); co-, ter-, and quater-polymers of the following co-monomers: ethylene, butadiene, isoprene, styrene, divinylbenzene, divinyl amine, 1,4-pentadiene-3-one (divinyl ketone), 1,6-heptadiene-4-one (diallyl ketone), diallyl amine, ethylene glycol, acrylamide, AMPS, acrylonitrile, vinyl ac-

etate, vinyl alcohol, vinyl amine, vinyl sulfonate, styryl sulfonate, acrylate, methyl acrylate, methacrylate, methyl methacrylate, and vinylpyrrolidone, vinyl lactam; and mixtures and combinations thereof.

[c2] 2.The method of claim 1, wherein the viscosified brine includes a salt selected from the group consisting of halide brines, formate brines, and acetate brines.

[c3] 3.The method of claim 1, wherein the viscosified brine includes a salt selected from the group consisting of $ZnCl_2$, $ZnBr_2$, $CaBr_2$, $ZnBr_2/CaBr_2$ blends, $ZnBr_2/CaBr_2/CaCl_2$ blends, KBr, KI, $KHCO_2$, KCH_3CO_2, CsBr, CsI, $CsHCO_2$, $CsCH_3CO_2$, and mixtures thereof.

[c4] 4.The method of claim 1, wherein the viscosified brine further includes one or more additives selected from the group consisting of: a rheology modifier, a surface tension reducer, a thermal stabilizer, a coalescing agent, a soluble weighting agent and insoluble weighting agent, a soluble bridging agent, and insoluble bridging agent, a sealant or combinations or mixtures thereof.

[c5] 5. The method of claim 1, wherein the method further comprises inserting an injection tube into the casing annulus and injecting the viscosified brine into the casing annulus by way of the injection tube.

[c6] 6. The method of claim 1, wherein the method further comprises bleeding off the less dense casing annulus fluid simultaneously with the injection of the viscosified brine.

[c7] 7. The method of claim 1, wherein the method further comprises bleeding off the less dense casing annulus fluid subsequent to injecting the viscosified brine.

[c8] 8. A method for the remediation of a sustained casing annulus pressure in a casing annulus of a subterranean well, wherein the casing annulus contains a casing annulus fluid, the method including injecting a brine having a density higher than the density of the casing annulus fluid, the improvement comprising formulating the brine to include a viscosifying agent in a concentration to make the brine fall down the casing annulus without dispersing and thus displacing the casing annulus fluid.